

REMARKS

Claims 1-67 are pending in the subject application. The Examiner has rejected claims 1-9, 24-30, 33-46, 48-58, and 60-64 and objected to claims 10-23, 31-32, 47, 59, and 65-67. Applicant has amended claims 1, 24, 28-29, 31-32, 40, 44-50, 54, 57-60, and 63-66. No new matter has been added.

Applicant will address various issues raised by the Examiner.

Claim Rejections under 35 U.S.C. §102(b) and 35 U.S.C. §103(a)

Claims 1-9, 24-26, 28-30, 33-45, 48-56, 58, and 60-64 stand rejected under 35 U.S.C. §102(b) as being anticipated by or, in the alternative, under 35 U.S.C. §103(a) as obvious over TANAKA (U.S. Patent No. 5,153,066). Claims 27, 46, and 57 stand rejected under 35 U.S.C. §103(a) as being unpatentable over TANAKA in view of BRYANT (U.S. Patent No. 5,366,801). Applicant respectfully traverses the rejections with respect to claims 1-9, 24-30, 33-46, 48-58, and 60-64. Nonetheless, in an effort to expedite the prosecution of the subject application, amendments have been submitted to more fully distinguish over the cited references. In addition, various amendments have been submitted for clarification or consistency.

Claim 1 recites a multi-component fiber that comprises “a fiber body formed from a plurality of elongated members, at least one of the elongated members comprising a polymeric phase change material having a transition temperature in the range of 22°C to 40°C, wherein the polymeric phase change material provides thermal regulation based on at least one of melting and crystallization of the polymeric phase change material at the transition temperature.”

Claim 1 includes a number of limitations that are not shown or suggested by the cited references, taken either individually or in combination. For instance, Applicant’s review of the cited references did not identify any teaching directed to a multi-component fiber that comprises a “polymeric phase change material having a transition temperature in the range of 22°C to 40°C, wherein the polymeric phase change material provides thermal regulation based on at least one of melting and crystallization of the polymeric phase change material at the transition temperature.” TANAKA makes reference to a temperature-sensitive color-changeable composite fiber but fails to show or suggest a multi-component fiber that comprises a “polymeric phase change material” as recited in claim 1. In particular, while TANAKA makes reference to a

thermally color-changeable material that forms, changes, or loses color by temperature change, this cited reference fails to show or suggest a “polymeric phase change material having a transition temperature in the range of 22°C to 40°C, wherein the polymeric phase change material provides thermal regulation based on at least one of melting and crystallization of the polymeric phase change material at the transition temperature.” BRYANT makes reference to coating individual fibers and fibers that are incorporated in a fabric, but, like TANAKA, BRYANT fails to show or suggest a multi-component fiber that comprises a “polymeric phase change material” as recited in claim 1. In particular, while BRYANT makes reference to a phase change material, this cited reference fails to show or suggest the recited “polymeric phase change material,” much less a multi-component fiber that comprises such “polymeric phase change material.” For these reasons, the cited references can neither anticipate nor render obvious the invention defined by claim 1.

Claims 2-9 depend from claim 1 and are allowable for at least the reasons set forth above for claim 1.

Claim 10 recites a multi-component fiber that comprises “a first elongated member comprising a first polymeric material and a first temperature regulating material dispersed within the first polymeric material.” The multi-component fiber also comprises “a second elongated member comprising a second polymeric material and a second temperature regulating material dispersed within the second polymeric material, wherein the second elongated member is joined with the first elongated member.”

The Examiner has objected to claim 10 as being dependent upon a rejected base claim and indicated that it would be allowable if rewritten in independent form. However, Applicant wishes to point out that claim 10 is already written in independent form. Thus, Applicant submits that claim 10 is in a condition for allowance.

Claims 11-23 depend from claim 10 and are allowable for at least the reasons set forth above for claim 10.

Claim 24 recites a multi-component fiber that comprises “a core member comprising a first temperature regulating material dispersed therein, wherein the first temperature regulating material comprises a phase change material having a transition temperature in the range of -5°C to 125°C and a plurality of microcapsules that contain the phase change material.” The multi-

component fiber also comprises “a sheath member surrounding the core member, wherein the sheath member comprises a second temperature regulating material dispersed therein.”

Claim 24 includes a number of limitations that are not shown or suggested by the cited references, taken either individually or in combination. For instance, claim 24 has been amended to include limitations similar to that of previously pending claim 31, which depends from claim 24. The Examiner has objected to claim 31 as being dependent upon a rejected base claim and indicated that it would be allowable if rewritten in independent form. Thus, Applicant submits that claim 24 is in a condition for allowance.

Claims 25-39 depend from claim 24 and are allowable for at least the reasons set forth above for claim 24. With respect to claim 31 as currently amended, the cited references fail to show or suggest that “the second temperature regulating material comprises a second phase change material having a transition temperature in the range of -5°C to 125°C and a second plurality of microcapsules that contain the second phase change material.”

Claim 40 recites a fiber that comprises “at least one inner member extending through substantially the length of the fiber and comprising a blend of a first polymeric material and a non-encapsulated phase change material having a transition temperature in the range of 22°C to 40°C, wherein the non-encapsulated phase change material provides thermal regulation based on at least one of absorption and release of a latent heat at the transition temperature, and wherein the non-encapsulated phase change material is selected from the group consisting of solid/solid phase change materials and polymeric phase change materials.” The fiber also comprises “an outer member surrounding the inner member and forming the exterior of the fiber, wherein the outer member comprises a second polymeric material.”

Claim 40 includes a number of limitations that are not shown or suggested by the cited references, taken either individually or in combination. For instance, Applicant’s review of the cited references did not identify any teaching directed to a fiber that comprises “at least one inner member ... comprising a blend of a first polymeric material and a non-encapsulated phase change material having a transition temperature in the range of 22°C to 40°C, wherein the non-encapsulated phase change material provides thermal regulation based on at least one of absorption and release of a latent heat at the transition temperature, and wherein the non-encapsulated phase change material is selected from the group consisting of solid/solid phase change materials and polymeric phase change materials.” TANAKA makes reference to a

temperature-sensitive color-changeable composite fiber but fails to show or suggest a fiber that comprises at least one inner member comprising a “non-encapsulated phase change material” as recited in claim 40. In particular, while TANAKA makes reference to a thermally color-changeable material that is enveloped in a microcapsule, this cited reference fails to show or suggest a “non-encapsulated phase change material having a transition temperature in the range of 22°C to 40°C, wherein the non-encapsulated phase change material provides thermal regulation based on at least one of absorption and release of a latent heat at the transition temperature, and wherein the non-encapsulated phase change material is selected from the group consisting of solid/solid phase change materials and polymeric phase change materials.” BRYANT makes reference to coating individual fibers and fibers that are incorporated in a fabric, but, like TANAKA, BRYANT fails to show or suggest a fiber that comprises at least one inner member comprising a “non-encapsulated phase change material” as recited in claim 40. In particular, while BRYANT makes reference to microcapsules containing a phase change material, this cited reference fails to show or suggest the recited “non-encapsulated phase change material,” much less a fiber that comprises at least one inner member comprising such “non-encapsulated phase change material.” For these reasons, the cited references can neither anticipate nor render obvious the invention defined by claim 40.

Claims 41-53 depend from claim 40 and are allowable for at least the reasons set forth above for claim 40.

Claim 54 recites a core/sheath fiber that comprises “a core member positioned within and extending through substantially the length of the fiber, wherein the core member comprises a blend of a first polymeric material and a non-encapsulated phase change material, wherein the first polymeric material has a partial affinity for the non-encapsulated phase change material, such that the non-encapsulated phase change material forms a plurality of domains dispersed within the first polymeric material.” The core/sheath fiber also comprises “a sheath member forming the exterior of the fiber and surrounding the core member, wherein the sheath member comprises a second polymeric material.”

Claim 54 includes a number of limitations that are not shown or suggested by the cited references, taken either individually or in combination. For instance, Applicant’s review of the cited references did not identify any teaching directed to a core/sheath fiber that comprises “a core member ..., wherein the core member comprises a blend of a first polymeric material and a

non-encapsulated phase change material, wherein the first polymeric material has a partial affinity for the non-encapsulated phase change material, such that the non-encapsulated phase change material forms a plurality of domains dispersed within the first polymeric material.” TANAKA makes reference to a temperature-sensitive color-changeable composite fiber but fails to show or suggest a core/sheath fiber that comprises a core member comprising a “non-encapsulated phase change material” as recited in claim 54. In particular, while TANAKA makes reference to a thermally color-changeable material that is enveloped in a microcapsule, this cited reference fails to show or suggest a “non-encapsulated phase change material, wherein the first polymeric material has a partial affinity for the non-encapsulated phase change material, such that the non-encapsulated phase change material forms a plurality of domains dispersed within the first polymeric material.” BRYANT makes reference to coating individual fibers and fibers that are incorporated in a fabric, but, like TANAKA, BRYANT fails to show or suggest a core/sheath fiber that comprises a core member comprising a “non-encapsulated phase change material” as recited in claim 54. In particular, while BRYANT makes reference to microcapsules containing a phase change material, this cited reference fails to show or suggest the recited “non-encapsulated phase change material,” much less such “non-encapsulated phase change material” that “forms a plurality of domains dispersed within the first polymeric material.” As discussed in the subject application at, for example, paragraph nos. 76-77, domain formation can lead to an improved thermal regulating property by facilitating transition of a phase change material between two states. In addition, domain formation can serve to reduce or prevent loss or leakage of the phase change material from the resulting fiber during processing or during use. For these reasons, the cited references can neither anticipate nor render obvious the invention defined by claim 54.

Claims 55-59 depend from claim 54 and are allowable for at least the reasons set forth above for claim 54.

Claim 60 recites an island-in-sea fiber that comprises “a plurality of island members positioned within and extending through substantially the length of the fiber, wherein each of the island members is separated from one another, and at least one of the island members comprises a blend of an island polymeric material and at least two different phase change materials.” The island-in-sea fiber also comprises “a sea member forming the exterior of the fiber and

surrounding each of the island members, wherein the sea member comprises a sea polymeric material.”

Claim 60 includes a number of limitations that are not shown or suggested by the cited references, taken either individually or in combination. For instance, claim 60 has been amended to include limitations similar to that of previously pending claim 65, which depends from claim 60. The Examiner has objected to claim 65 as being dependent upon a rejected base claim and indicated that it would be allowable if rewritten in independent form. Thus, Applicant submits that claim 60 is in a condition for allowance.

Claims 61-67 depend from claim 60 and are allowable for at least the reasons set forth above for claim 60.

In conclusion, Applicant respectfully submits that the cited references fail to teach or suggest the structure or implementation of the invention recited in the claims of the subject application and, thus, that the cited references cannot, as a matter of law, anticipate the claimed invention under 35 U.S.C. §102(b) or render obvious the claimed invention under 35 U.S.C. §103(a). Applicant, therefore, respectfully requests withdrawal of the rejections under 35 U.S.C. §102(b) and 35 U.S.C. §103(a).

Summary

For the reasons set forth above, Applicant respectfully submits that the subject application is in a condition for allowance. An early notice of allowance is, therefore, earnestly requested.


If in the opinion of the Examiner a telephone conference would expedite the prosecution of the subject application, the Examiner is invited to call the undersigned at (650) 843-5852.

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Respectfully submitted,
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